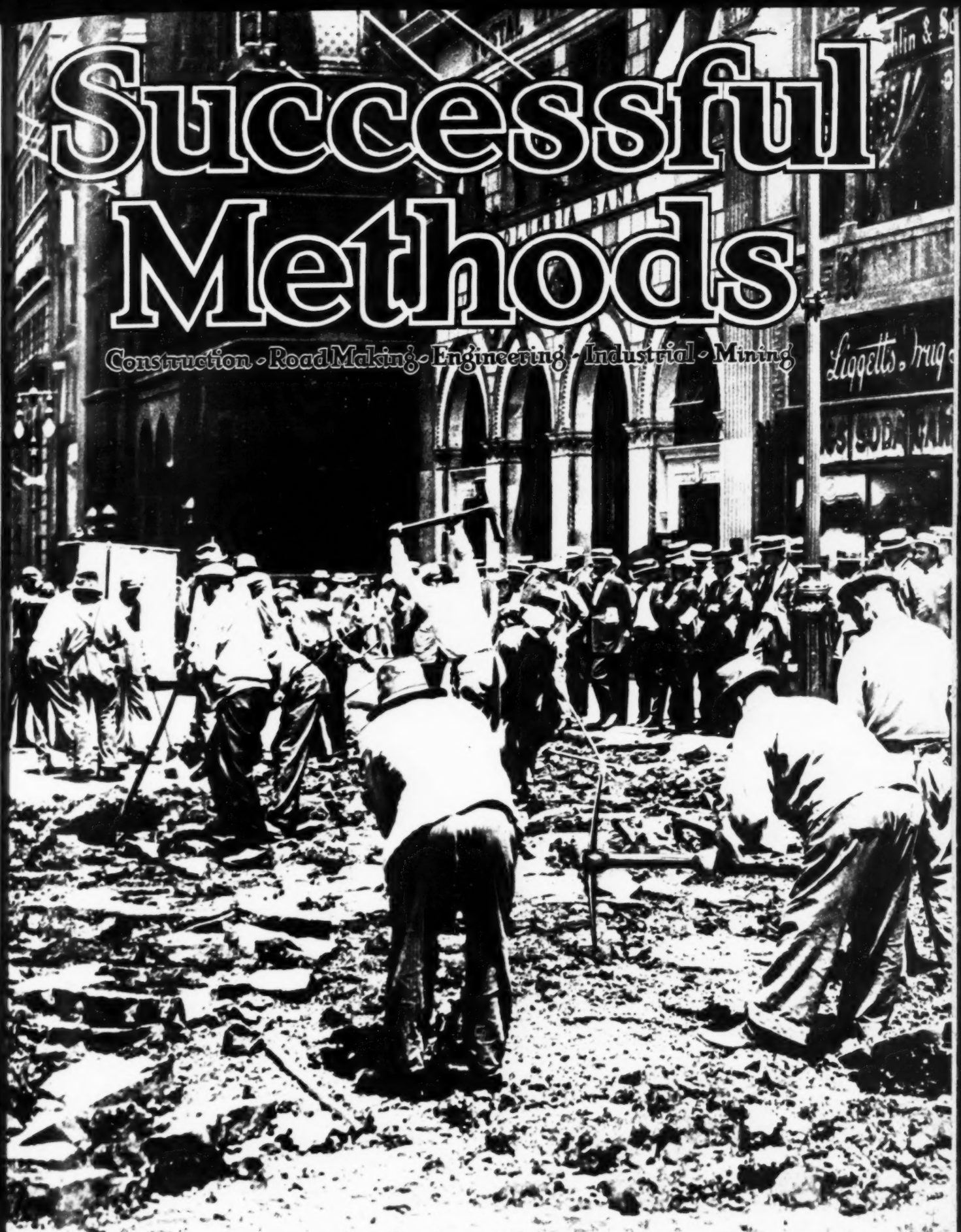
Successful Methods

Construction - Road Making - Engineering - Industrial - Mining



The Attack on Fifth Avenue

Vol. 5. August 1923 No. 8

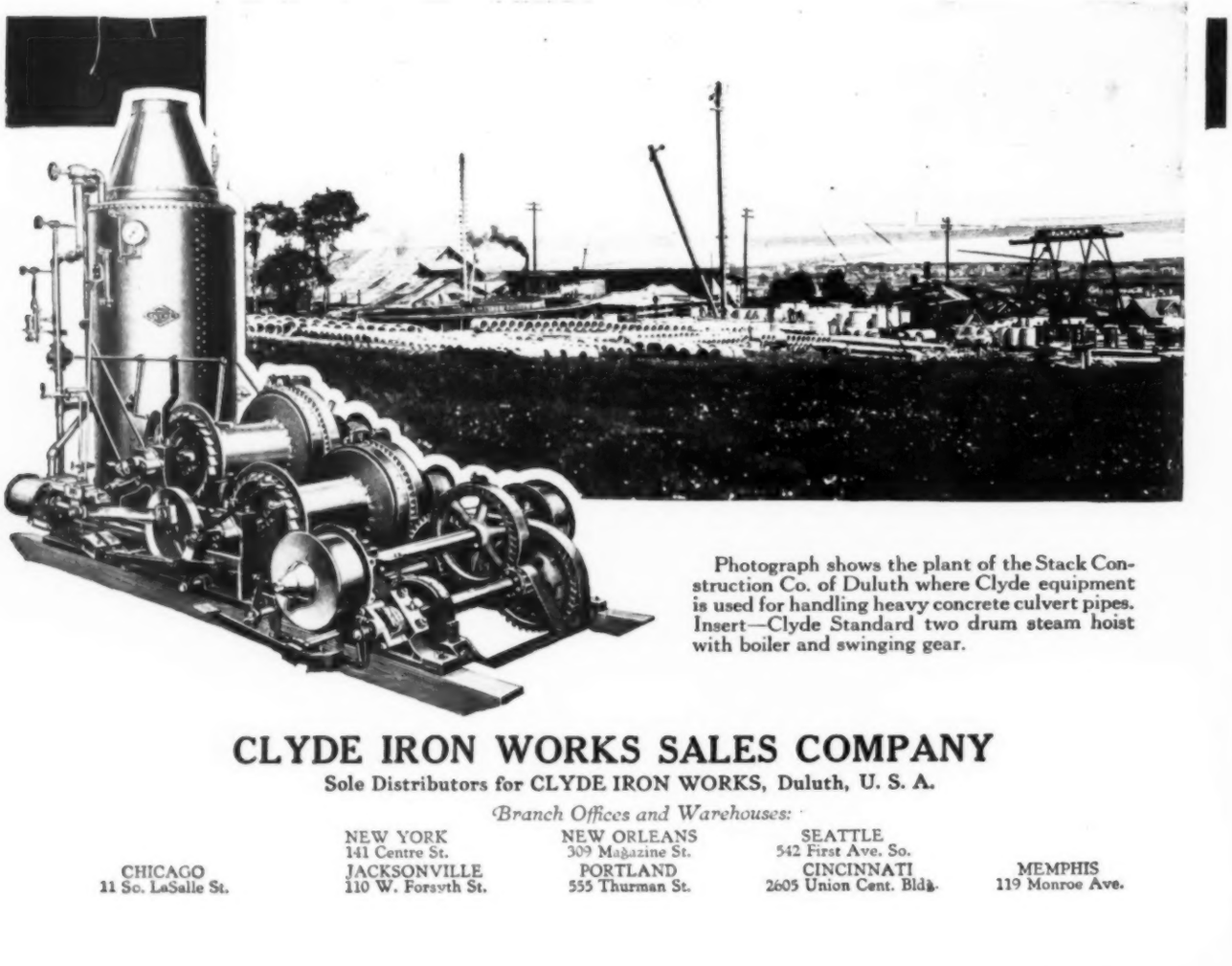
CLYDES as Factory Helpers

While Clyde Equipment is admittedly one of the most important factors in bringing about economical construction in the contractors' field, its benefits are not confined to that field by any means. Manufacturers everywhere are finding various units of the Clyde line highly advantageous in keeping down production costs.

Every manufacturing plant of any size is faced with problems such as handling raw materials or finished products, loading or unloading on to cars, moving materials from one operation to the next. Many units of the Clyde Line will meet these requirements.

A frank statement of your problems will receive thorough consideration by the Clyde engineers, who will make definite recommendations to you—without obligation on your part. And bear in mind that every piece of equipment leaving the Clyde plant is built to fixed quality standards and is covered by the Clyde guarantee against original defects.

You'll Take Pride in Your Clyde!



Photograph shows the plant of the Stack Construction Co. of Duluth where Clyde equipment is used for handling heavy concrete culvert pipes. Insert—Clyde Standard two drum steam hoist with boiler and swinging gear.

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Vol. 5 AUGUST, 1923 No. 8

The Fall Rush

EVERY year a surprisingly large part of all construction work gets into a jam at the end of the season in the States where cold weather is a factor. This year several new factors have delayed a lot of jobs far beyond schedule. Much of this behind-time work cannot wait until next year. It must be finished in the next three or four months.

As a result there will be a mad scramble on many jobs. Overtime and night work will be necessary. Labor and materials will simply have to be had.

A lot of construction men who are facing such a situation will wait until September, or even October, before they realize or acknowledge what they are up against. They appear "to wait for something to turn up." They would save themselves a lot of money by facing the music now while there is still time.

Another shovel crew, or an additional mixer, or a power loader or some other piece of plant on the job now would save the situation in many cases. Six weeks or two months from now it will have to be bought anyway. Then overtime and night work will cut profits, or even show a loss. Why wait?

What's the Matter with Concrete?

CONCRETE is reported to suffer from many ills. Most of these ills have lately been traced by a small group of scientists to the deficiencies of cement made to meet the present standard specifications. A variety of cement specifications has been suggested by these men as a panacea for concrete's afflictions.

These laboratory men leave the impression that they have overlooked the almost countless number of concrete structures of every conceivable type which stand undiminished in value after many years of use. Judging solely from their statements in print, it also appears that they have passed lightly over several other factors, each of which may very seriously affect the quality of concrete.

Cement made to meet the present standard specifications may not be all that might be desired. Cement manufacturers never have claimed perfection for it. They are continually spending large sums to improve their product. Such practical procedure is certain to give users better cement more quickly than any of the half-practical ideas that have been suggested for a variety of cement specifications.

What really is needed is better aggregates and better methods of mixing, placing and curing. In view of the treatment that cement gets in practise, it is a wonder that there are so few concrete failures.

The need for clean, sound, well-proportioned aggregates is now generally understood. It is surprising, however, to find how much questionable material is used. Investigators of poor concrete might well concentrate on this single cause of trouble.

Excess water in the mix is a factor of concrete weakness that is not so well known. Any good foreman is ready to fight when accused of skinning on cement. But when he uses in a one-bag batch a quart of water over what is needed for a proper mix, he weakens the concrete just as much as by leaving out three or four pounds of cement. It will be hard to convince any foreman of this fact.

Other simple conditions of mixing, placing and curing are possible causes of serious weakening of concrete. Few men who handle these operations really know as much as they should about how such work ought to be done.

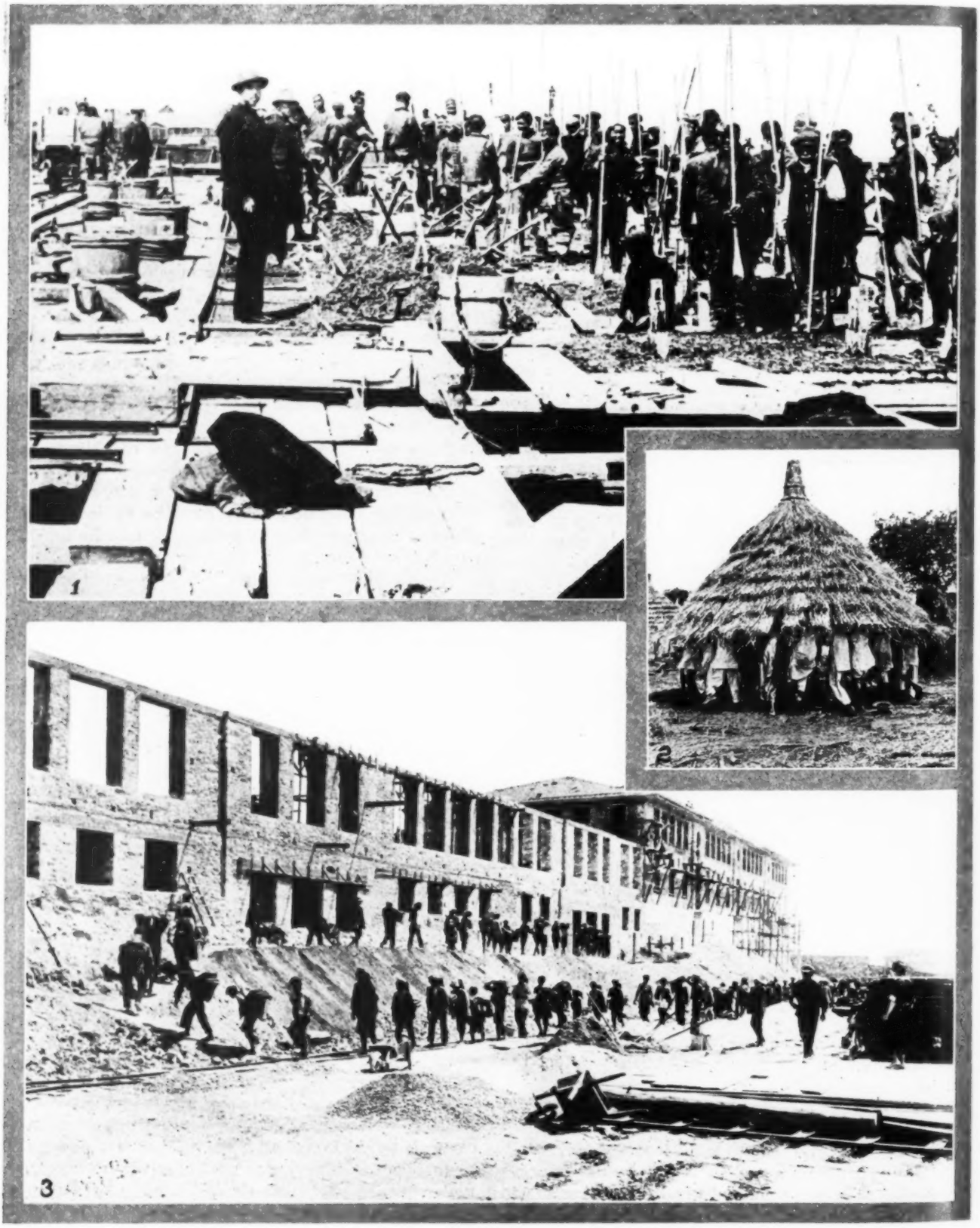
Cement users, by showing their men the proper methods of mixing, placing and curing, can immediately get concrete that will meet every practical need. Some advantages might be gained by the adoption of several sets of cement specifications to replace the one present standard under which so much progress has been made. To follow such a course now certainly does not appear to be good policy for any of all those who would be affected.

The Black Birds Are Migrating

A HORDE of negroes has left the South for the industrial districts of the North in the last few months. A recent estimate placed the migration this year at more than 100,000 from one State alone. This great shift of labor has introduced a new problem on construction work in many sections of the South.

On a recent motor car trip of several hundred miles, made to visit road work in a Southern State, most of the jobs were planted as though labor was cheap and plentiful. Machinery was used only where experience under the old conditions showed hand labor was more expensive. Very few contractors on the jobs visited are making any money. Those who were had plenty of good labor-saving equipment.

Hand Labor

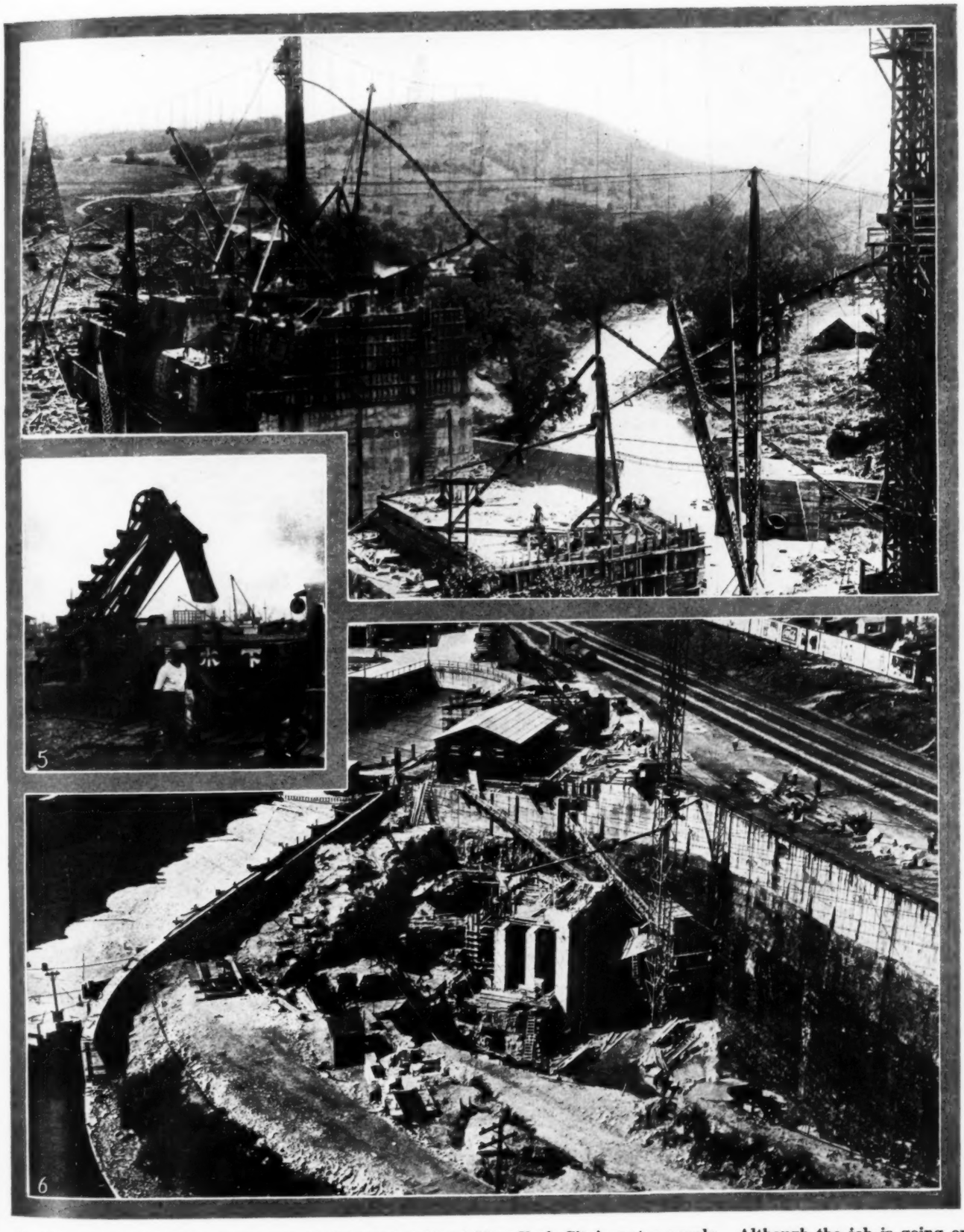


1—Building a dock at a Chinese seaport with so many coolies on the job that they almost get in each other's way. © P & A Photos

2—Raising the roof in Africa. When they build a hut the natives fashion the roof on the ground and the whole gang lifts it into place. © P & A Photos

3—Refugees from Turkey, most of them children, building a home for themselves on the Greek Island of Syra under the direction of the Near East Relief. © International

Machinery



4—At work on the Gilboa Dam, one of the great units of New York City's water supply. Although the job is going on at full blast, only a few men are in sight. © *Keystone*
5—An American-made machine that is making good in Japan, even though hand labor is comparatively cheap.
6—Part of the work on the new hydro-electric development at Niagara Falls. As in the upper picture on this page, the machines are hard at work and only a few men are needed to run them. © *International*

THE HIGH COST OF PAVING

Fifth Avenue Job Consumes Valuable Time of New York's Busiest Men

A CONSTRUCTION job that is setting records in the number of onlookers which would make the promoters of the Shelby prize fight weep with envy is now going on in New York City. Fifth Avenue, from Forty-second to Fifty-ninth Street, is being repaved and if the total time consumed by merchants, bankers, lawyers, stenographers and office boys in watching the antics of the steam shovel and its attendant motor trucks is reckoned in the cost of the job, it probably ranks as the most expensive job ever done. Not a single move of the workers is missed by the army of spectators who camp out along the curbstone every day. The photograph on the cover of this issue of SUCCESSFUL METHODS shows the ripping up of the old pavement going on under the eyes of a thoroughly appreciative gallery.

So big was the crowd on the day work started at the corner of Forty-second Street and Fifth Avenue, one of the busiest corners in New York, that traffic policemen had to take charge of the work of keeping the onlookers out of reach of the steam shovel. They insisted on crowding in so close that until the policemen arrived on the scene it was impossible to go on with the work.

The work is being done by Charles D. Beckwith, Inc., an organization which has done paving work in many cities. Because of the intense traffic on Fifth Avenue which has to be detoured around the work, a careful schedule was made out in advance by Joseph Johnson, Commissioner of Public Works of the Borough of Manhattan.

The ripping up of the pavement began on June 25 and Forty-second Street and the three blocks between Forty-second and Forty-fifth Streets were closed up. A steam shovel was used to remove the asphalt surface and loaded it into trucks which carted it to a dumping ground 3 miles away on Long Island. From 12 to 18 trucks are employed continuously on this work. As soon as the asphalt surface was stripped the street was turned over to the various public utility companies, such as the steam pipe, electric, gas, water, sewer, telephone companies, etc., which had sub-surface work to do. They worked both night and day making necessary repairs, installing new conduits, etc., and the contractor followed them up with a small mixer which re-laid the concrete where it had been disturbed. Then the binder of asphaltic concrete was laid covered by a wearing surface of sheet asphalt. Because of the speed needed, about 110 to 125 men employed by the contractor are on the job. The work

BREAKING UP THE OLD ASPHALT SURFACE

THE SHOVEL LOADING TRUCK WITH BIG PIECES OF OLD ASPHALT SURFACE

is so planned that at no one time more than 4 blocks will be ripped up. The work began on June 25 and the schedule calls for completion the latter part of August.

The photograph on the cover and that which appears at the bottom of Page 4 were taken and are copyrighted by Ewing Galloway. The photograph at the top of this page is the work of Morris Rosenfeld. In the latter photograph may be seen a sign on the cab of the truck reading "5th Avenue Paving. C. D. Beckwith, Inc." These signs not only give the contractors some useful advertising, but also greatly speed the movement of the trucks, especially when they reach Fifth Avenue, where heavy trucking is not ordinarily allowed.

C. D. Beckwith, president of C. D. Beckwith, Inc., is giving the job his personal attention. H. B. Colby is the superintendent.

WARNINGS OF GRADE CROSSINGS TO BE PAINTED ON PAVEMENT OF NEW YORK ROADS

IN an effort to reduce the number of accidents at railroad crossings in New York State, Frederick Stuart Greene, Commissioner of Highways, has directed the use of a distinctive method of marking the pavement at approaches to railroads. The user of the highway who approaches the tracks from either direction will first be confronted by two wide parallel stripes, 2 ft. wide and painted on the road 5 ft. apart. These stripes will stretch from one side of the pavement to the other and will be painted 230 ft. from the nearest railroad track. A second warning stripe also 2 ft. wide, will be painted 125 ft. from the track.

A third and last warning consisting of a stripe 2 ft. wide painted with white and black diagonal bars similar to the markings on railroad guards, will be located 25 ft. from the nearest track and if the driver of an automobile is not exceeding the regular rate of speed he will have room enough to stop before crossing the track.

The results obtained by this method of marking will be watched with great interest all over the country by those in charge of highway work. The use of the pavement itself for traffic guides of various kinds is still in a process of development. One problem, of course, is the development of a paint which will keep reasonably bright and distinct under such circumstances. Commissioner Greene's new plan undoubtedly will bring about a decrease in the number of grade crossing accidents in New York State. They ought to be especially useful at night when they will be more easily seen than a sign by the side of the road which is not necessarily in the path of the car's headlights.

NORFOLK IS DEVELOPING HARBOR

Virginia Port Is Constructing Extensive System of Wharves and Piers

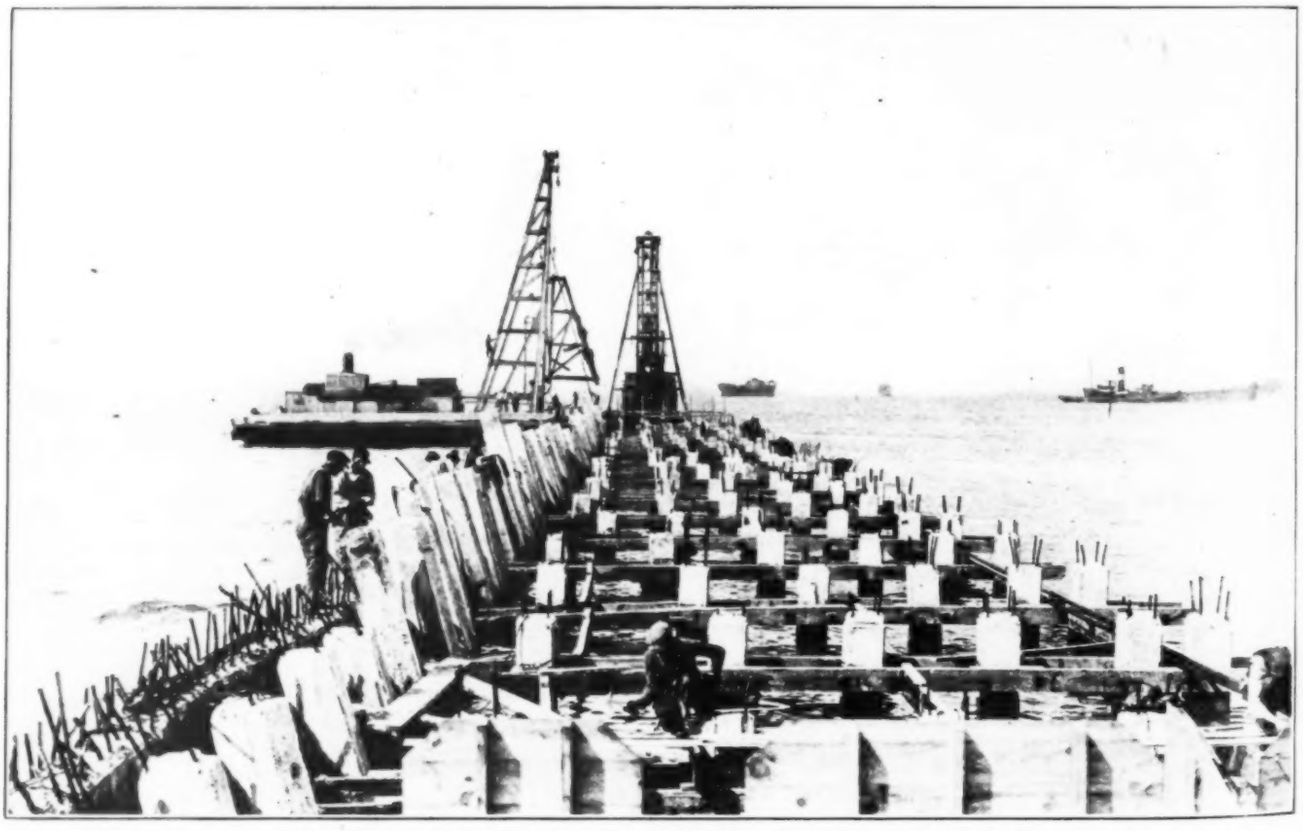
THE first units of the new port development of Norfolk, Va., which ultimately will cost about $25,000,000, are now being built under the supervision of the Folwell-Ahlskog Co. of Chicago. The photograph at the bottom of this page and that at the top of page 7 show two stages in the construction of one of the marginal wharves. This marginal wharf, of which there will be several miles when the entire port development is finished, is 35 ft. in width and carries two railroad tracks. The marginal wharf will be so constructed as to inclose certain areas between slips which will be filled in to form piers upon which concrete warehouses later will be constructed.

Three merchandise piers 1200 ft. long will be built with 300-ft. slips on each side, the center pier being 494 ft. wide and the other two 300 ft. wide. One of the slips is to be dredged inland more than one-quarter of a mile in order to provide water front for the grain elevator which is part of the improvement. The big center pier will have two transit sheds, one on each marginal wharf, with a supporting warehouse in the middle. Railroad tracks will be laid between the supporting warehouse and each transit shed.

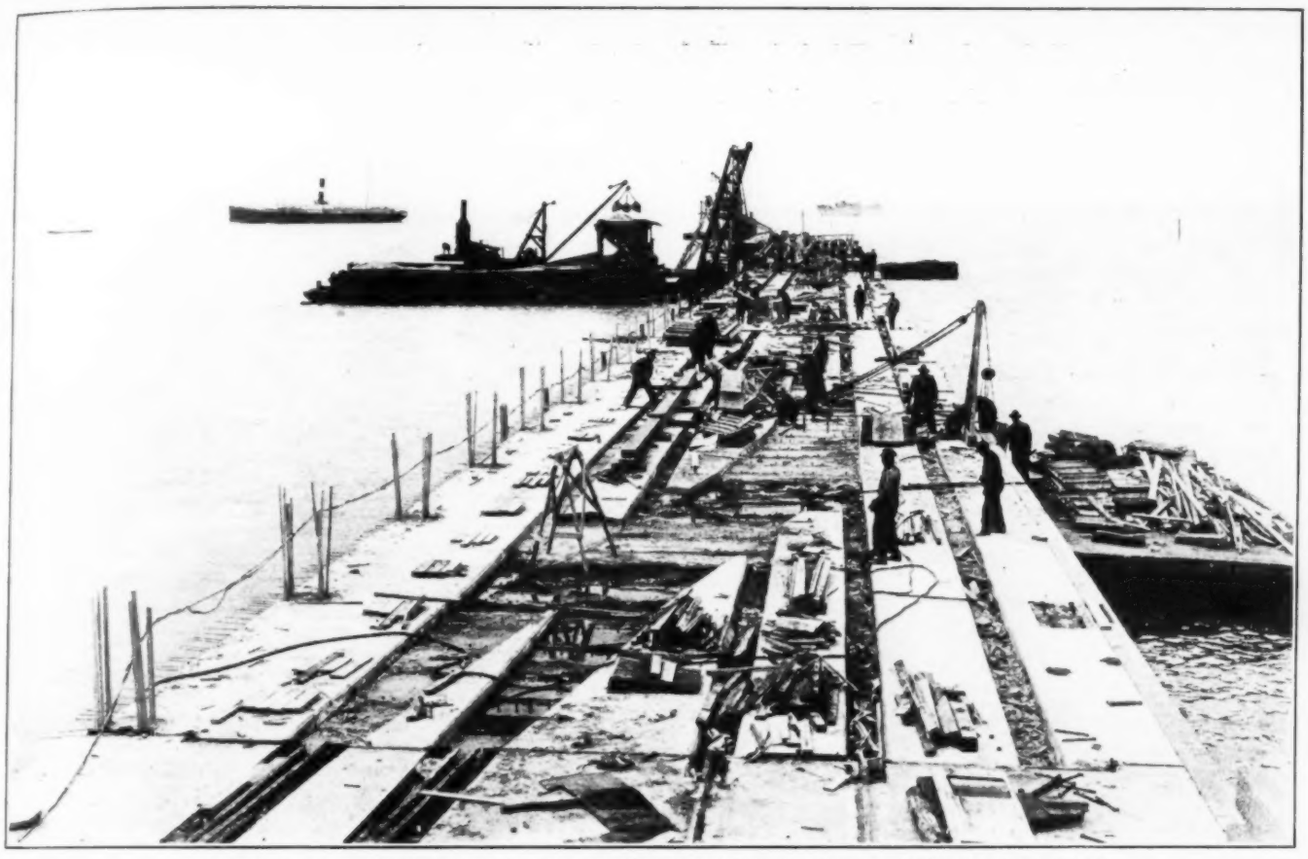
The photograph at the bottom of this page shows the marginal wharf after the 60-ft. concrete piles had been driven and before the decking was laid. As may be seen, the reinforced concrete piles were driven in 6 rows, pile drivers assisted by water jets doing the job. Each pile weighed approximately 12 tons. Around the outer edge of the wharf at the left of the photograph, are shown the batter piles and the steam hammer used in driving them can be seen at work at the end of the wharf. Beyond the batter piles are the reinforced concrete sheet piles.

The photograph at the top of the next page shows the same pier 26 days later after the reinforced concrete platform of girder beam and slab construction had been laid. The floating concreting plant may be seen at work at the end of the pier. As can be seen, the aggregates were brought to this plant in barges and from there were transferred to a bin with derrick and clamshell bucket. The mixer is equipped with a short section of chute with which the concrete was placed and as the wharf is only 35 ft. wide, this was not a difficult job.

Even before the actual construction of the piers began, a considerable amount of work had to be done. The ground first was bulkheaded and filled in and a 35-ft. channel was dredged alongside the elevator, which is built on a foundation of piling above the tidewater line. The dredging of this channel and other channels which will be necessary is being done with a suction-type dredge of 2000 hp. The material pumped out is used for filling in and in some cases the dredge has pumped it to points as far as 2 miles back of the main channel. The pipe line is carried on pontoons



SECTION OF MARGINAL WHARF BEFORE DECKING WAS PLACED



MARGINAL WHARF 26 DAYS LATER WHEN CONCRETE PLATFORM HAD BEEN LAID

and bulkheads to the shore and then overland. In some places it was necessary to carry it under railroad tracks and roadways. The dredge has a capacity of 12,000 cu. yd. per day when pumping the material over a considerable distance and since it has been at work has filled in a large area of low and swampy land in the rear of the pier, which it is expected will be utilized for factory and industrial buildings.

The grain elevator has been so designed that additional units of storage place can be added until it has reached a maximum capacity of 10,000,000 bu. Every precaution has been taken to eliminate the danger of grain dust explosions which in the past have destroyed elevators in other parts of the country.

It will be many years before Norfolk's port development is completed, but by going ahead now with the funds available, the city is taking advantage of its opportunity to keep pace with other ports on the Atlantic coast. The port of Norfolk is open to navigation all the year around.

UNIVERSITY OF MICHIGAN OFFERS FELLOWSHIPS IN HIGHWAY ENGINEERING AND HIGHWAY TRANSPORT

TWO of the following Fellowships will be awarded not later than Sept. 10 and two not later than Nov. 1, 1923, by the Board of Regents of the University of Michigan:

The Roy D. Chapin Fellowship in Highway Transport, which is offered to provide for the investigation of an approved subject relative to Highway Transport.

The Roy D. Chapin Fellowship in Highway Engineering, which is offered to provide for the investigation of an approved subject relative to hard surfaced roads and pavements.

Two Detroit Edison Fellowships in Highway Engineering, which are offered to provide for the investigation of approved subjects relative to moderate cost country roads.

General conditions: Each Fellowship pays the sum of $250, with an allowance of $50 for expenses. The holders of these Fellowships do not have to pay tuition fees. A Fellow must hold a Bachelor's Degree from a college of recognized standing. He must enroll as a graduate student in highway engineering or highway transport and as a candidate for the degree of Master of Science or Master of Science in Engineering. He must be in residence for one of the following periods: First Semester (October to February); Winter Period (December to March); Second Semester (February to June).

An application for a Fellowship must include a concise statement of the candidate's educational training and engineering experience and three references. Applications and requests for information in regard to the Highway courses should be sent to Prof. Arthur H. Blanchard, Engineering Bldg., University of Michigan, Ann Arbor, Mich.

KEEPING GRAVEL ROADS IN SHAPE

Patching and Resurfacing Methods Used on Wisconsin Highways

By J. T. Donaghey
Maintenance Engineer, Wisconsin Highway Commission

This is the second instalment of Mr. Donaghey's instructive article on maintenance of gravel roads in a State which is a recognized leader in such work.

THE patching material is composed of 17 gal. of light tar mixed thoroughly with 1 cu. yd. of torpedo sand or stone chips. The material must be mixed thoroughly either by hand or in a mixer and if it stands several days prior to being used after mixing, all the better. The oil evaporates and when cured for several days or weeks it makes a better patching material and will stay in place much better. Do not use more than 17 gal. of tar per cu. yd. of sand, even though it is slow in mixing. We are now (June 15) using patching material mixed last August, and it adheres even better than when used last season.

Those in charge of maintenance must watch the surface very carefully, especially the first 10 days after the surface treatment is applied. If a hole or abrasion appears in the surface the loose material should be swept out clean and the hole filled with patching material. If there are any places that appear loose and do not harden up under traffic, they should be dug out to a depth where solid material prevails, the hole filled and the material well tamped in and given an application of tar, and the following day covered with a coat of patching material. The patch will iron out and become equal to the balance of the surface within a few days. The patrolman must be sure to fill every hole just as fast as it appears noticeable to the eye, even though it is not more than ¼ or ½ in. in depth. A stitch in time on a surface treated gravel road certainly saves more than *nine*.

The outstanding points to insure satisfactory results are:

1. Do not add more than 1 in. of new material the season in which the treatment is given. In other words, if a gravel road is to be surface treated any additions in material required in the line of resurfacing should be applied the previous fall and permitted to compact during the winter and spring. However, light applications of ½ to 1 in. can be made early in the spring and good results obtained the same season.
2. The surface must be well compacted and uniform.
3. The surface must be swept as clean as possible.
4. The tar must be uniformly spread.
5. The covering must be applied immediately after the main application of tar, spread evenly, and a little less than 50 per cent of the required amount spread immediately following the distributor, the balance being applied later as required.
6. The surface treatment must be followed up promptly and carefully by the patrolman or mainte-

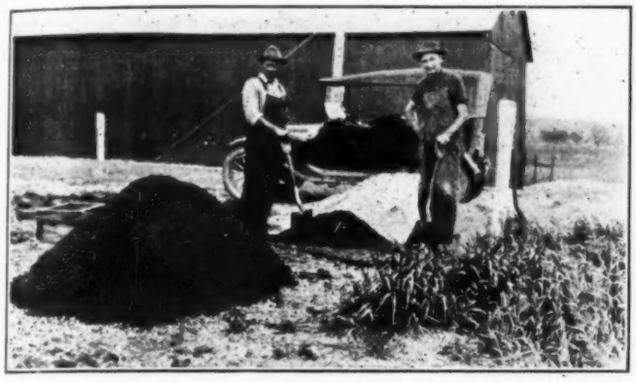
BREAKING UP THE TAR CRUST BEFORE RESURFACING BY MOVING GRADER BACK AND FORTH

nance gang and patching material must be added just as soon as the slightest hole is noticeable on the surface.

Unless plans are made to patch every hole the moment it appears, it is better not to attempt to maintain a gravel road with this type of surface treatment.

The first tar surface treatment of a gravel road 20 ft. wide will cost from $900 to $1,100 per mile. This, however, includes the follow-up maintenance and the entire patching cost for the season.

Where a road has been previously treated by this



MIXING THE PATCHING MATERIAL. THE BOX AT THE LEFT IS USED FOR MEASURING THE SAND

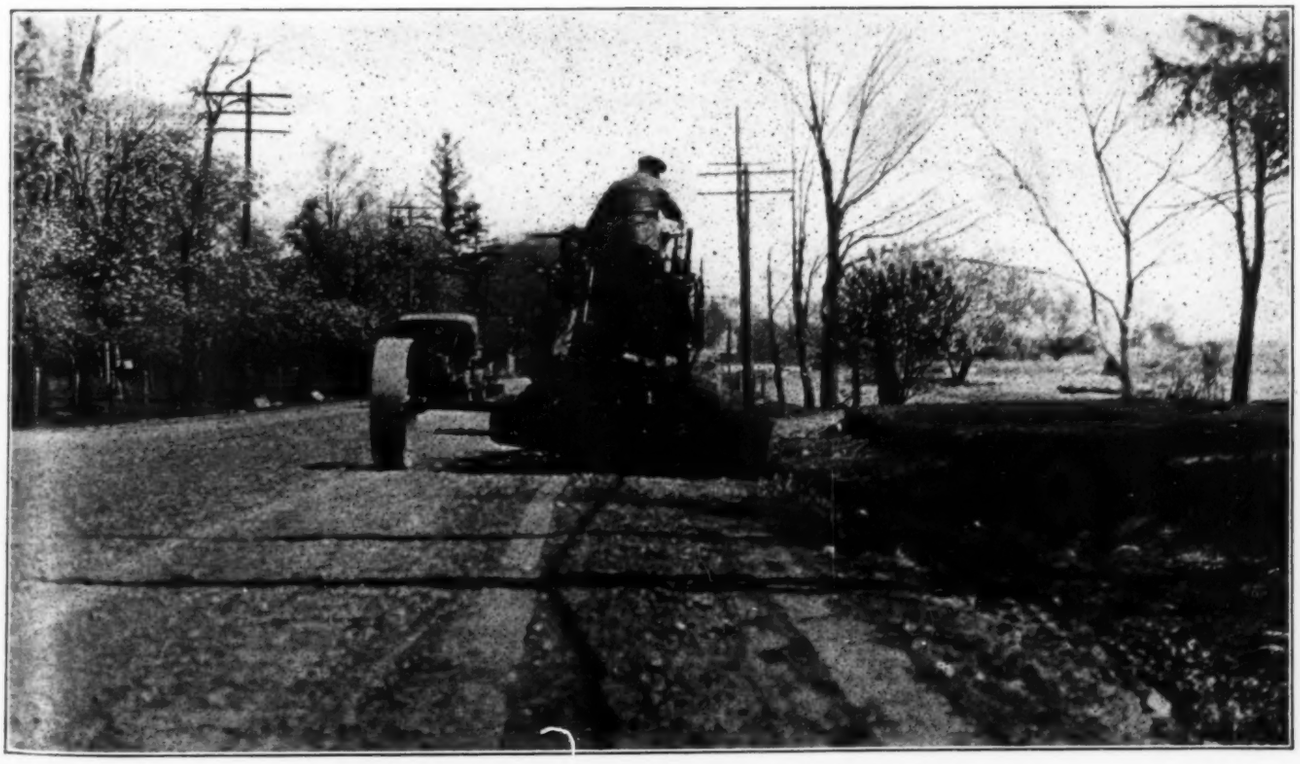
method, preparation for retreatment is as follows:

Any portions of the surface that are in perfect condition showing no ridges or wrinkles, may be retreated without scarifying or breaking up with a blade grader. Those portions that are slightly uneven should be gone over with a heavy blade grader early in the spring when the tar skin coat is inclined to be loosened up a trifle from frost action or weather conditions, pushing the skin coat out to the shoulder of the road with the grader and following this up with a lighter grader such as is used in patrol work, moving the material pushed to the side of the road back and forth across the surface of the road about twice a week for a period of two weeks.

This breaks up the old tar crust and the grader

THIS HEAVY PLANER IS USED FOR THE FINAL SMOOTHING OF THE NEW SURFACE

operations smooth up the surface of the road to a point where it is practically a perfect cross section. When the surface has become smooth and well compacted by these operations, it is swept clean and the covering material placed along the edge in piles the same as described under the new treatment. The tar is applied in the same manner as outlined for the second coat application and no priming coat is required. The one coat required for the second year's surface treatment is approximately 1/3 gal. The third year and thereafter 2/10 to ¼ gal. per sq. yd. The second



TRIMMING UP THE SHOULDERS WITH A BLADE GRADER

year treatment will cost from $750 to $900 per mile, including maintenance, and the third year and thereafter from $600 to $800.

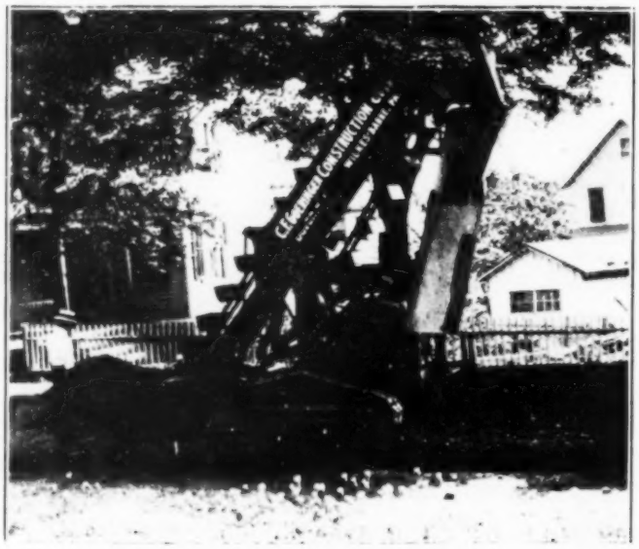
The application of the tar, spreading the covering, the follow-up patching, and everything connected with the work is done just the same as described under the new surface treatment.

All sections that have broken up badly at the time the frost is leaving in the spring should be scarified and then shaped up with a grader and on such sections after being shaped up and swept, a very light priming coat is applied before the main application.

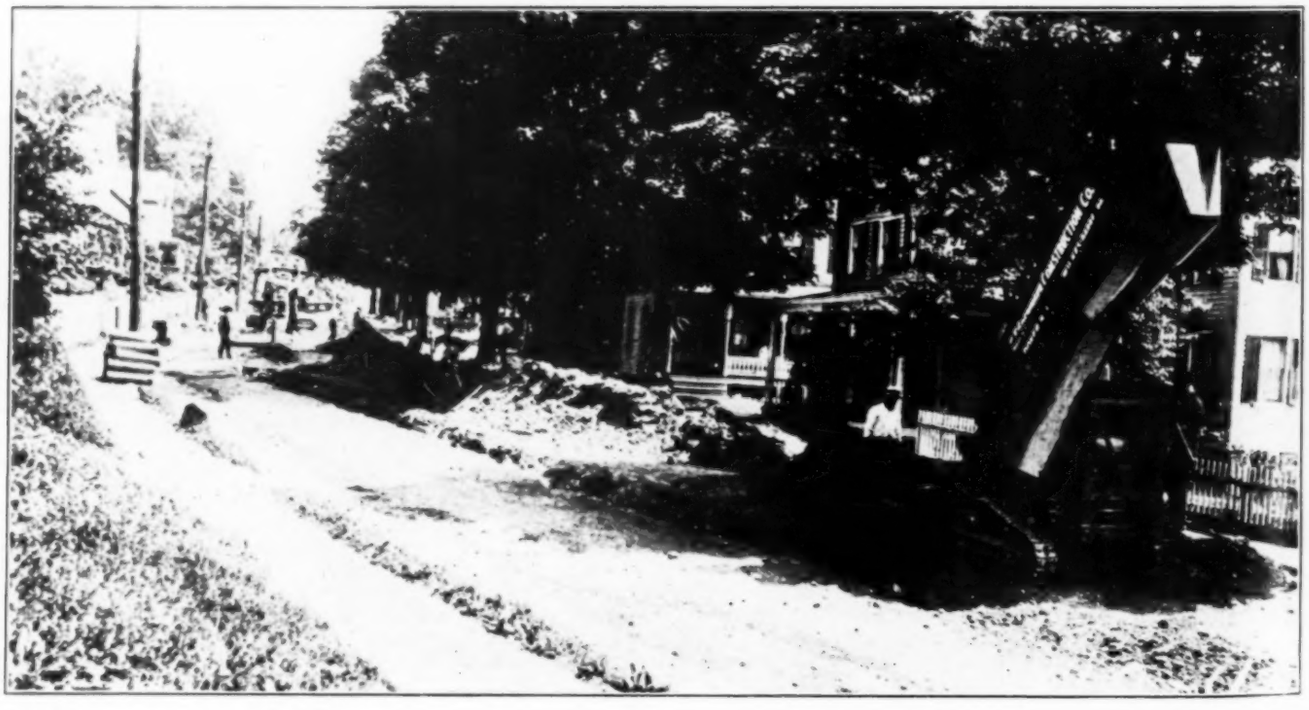
We have many gravel roads in Wisconsin that carry an average traffic through the open season of from 300 to 3000 vehicles per day, and if we attempted to maintain the surface untreated it would require the replacement annually of 400 cu. yd. or more, which in our State would cost not less than $1,000 a mile, as gravel costs us on the road an average of about $2.50 per cu. yd. This cost plus our patrol maintenance cost of about $200 per mile would result in a total cost of more for an untreated surface, when you figure the loss of material, than the treated surface costs according to our experience. We therefore believe it to be good business to conserve the material we have on our heavy traffic gravel surfaces by a light tar treatment annually and at the same time serve the public with a dustless, safe and pleasant road to travel.

LOADER WORKS AS BACK-FILLER ON SEWER JOB

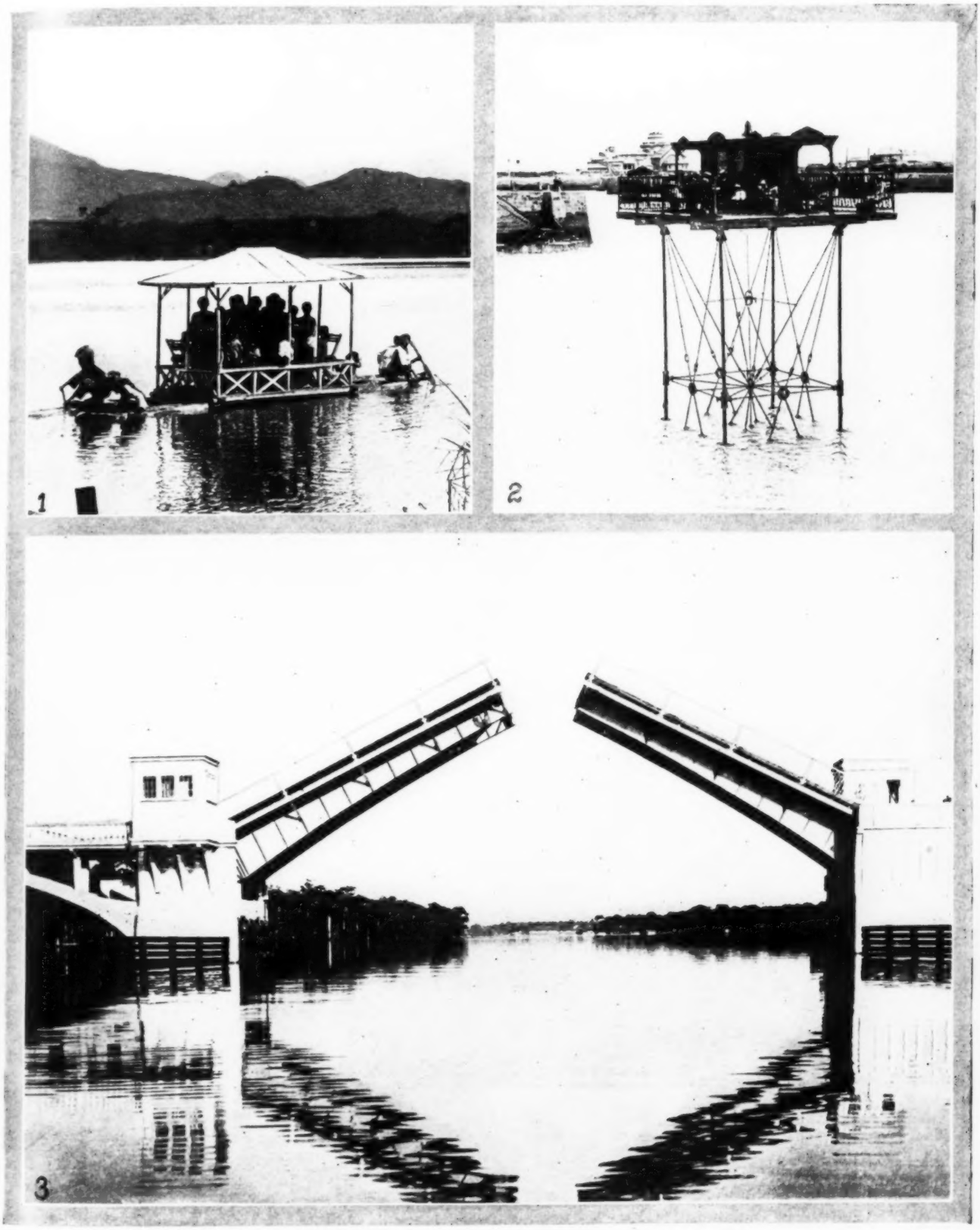
ON a sewer job in Dover, N. J., where the soil is fairly free from large stones and rock, the C. F. Goeringer Construction Co. of Wilkes-Barre, Pa., is using a 24-in. trenching machine for excavating and a self-propelled, self-feeding bucket loader for back-filling. The accompanying photographs show how the latter machine is being used. The loader is run into the piles of dirt left at one side of the trench by the trencher, the extension spout being kept in a position to discharge into trench.



In addition to doing this work, the loader is used to load surplus dirt into trucks for removal. Continuous record of operating is not available, but the contractor reports that recently between 10.30 a. m. and 4.30 p. m., with a half-hour off for lunch, the loader back-filled 290 lin. ft. of 24-in. trench running from 9 to 13 ft. deep, representing a total yardage of about 240 cu. yd. This sort of speed naturally means low costs.



Three Ways of Crossing a Stream



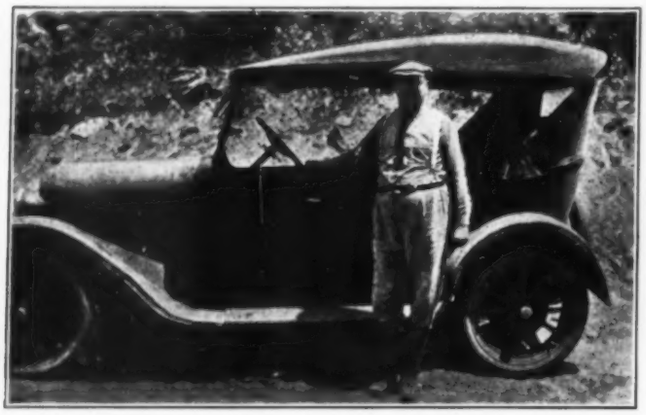
1—Getting across a river in Java. This pavilion-like boat is paddled from both ends. © *E. Galloway*
2—A ferry which runs on tracks below the surface of the water. It carries passengers from St. Malo to St. Servan in France and makes about the same speed as a steam ferry. © *E. Galloway*
3—A modern American highway bridge. This one is in Louisiana. © *International*

HIGHWAY IMPROVEMENT WITH LIMITED FUNDS

Cacapon District in West Virginia Is Getting Good Results at Moderate Cost. Contract Supplants Force Account

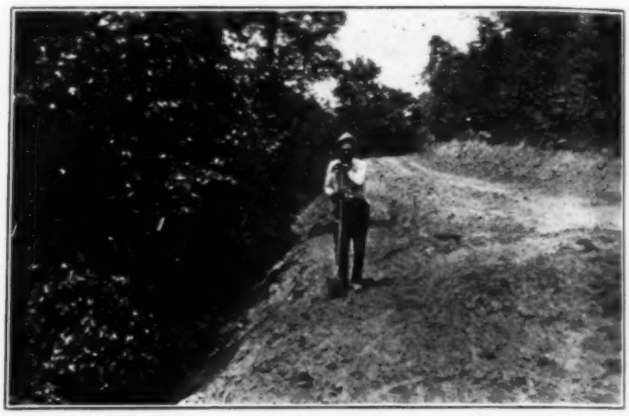
By S. H. Lea, District Engineer

A GOOD example of highway development under the district system is provided by the Cacapon District of Morgan County, West Virginia, which is building about 50 miles of roads with funds obtained by a bond issue of $250,000. This district road system



S. H. LEA, DISTRICT ENGINEER, READY FOR WORK

consists of about 18 miles of Class A roads and about 30 miles of Class B roads. Of the Class A roads, about 15 miles form part of the State route between Berkeley Springs and Romney, the county seats of Morgan and Hampshire Counties. This section, which extends from the village of Great Cacapon to the Hampshire County line, will be graded and drained by the

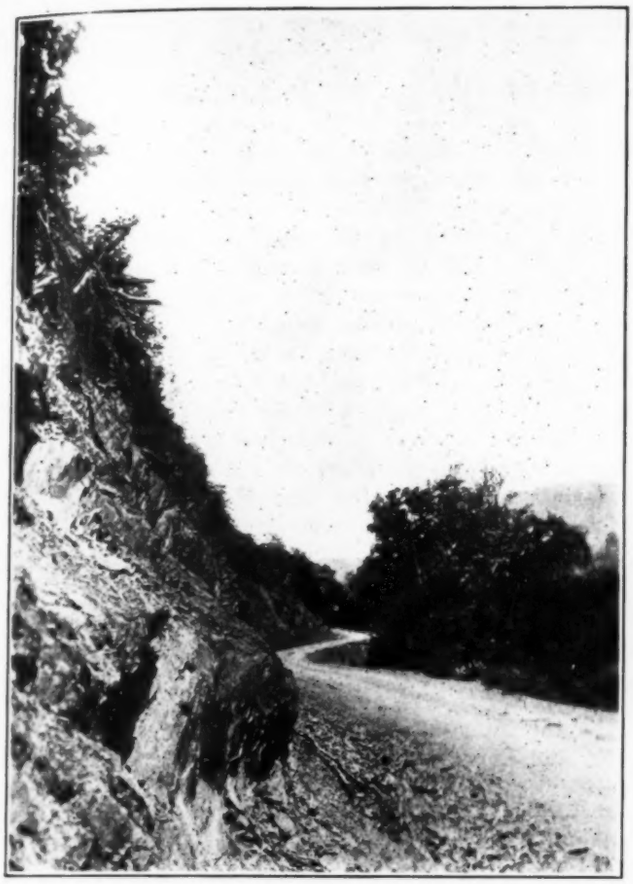


ONE OF THE DUMPMEN ON THE JOB

District and then will be taken over by the State for maintenance.

This road runs through the valley of the Great Cacapon River, crossing the stream in two places, in one place on a steel bridge and in the other on a concrete arch, both of which bridges will be used for the new road.

A SECTION OF THE COMPLETED ROAD



NEAR THE VILLAGE OF GREAT CACAPON, SHOWING THE SORT OF EXCAVATION NECESSARY

The section from the Hampshire County line to Paw Paw, a distance of 3 miles, is an old turnpike with fairly good grades and alignment. Therefore this section will not be graded, but will be hard surfaced with a base 5 in. thick and 16 ft. wide constructed of local rock which will be covered by a waterbound macadam surface course treated with tar.

The improvement of the Class B roads is limited to an expenditure of about $1,500 per mile, which prevents new construction except at necessary points.

The work of road construction under the bond issue began in 1921 south of the village of Great Cacapon, and at first was done by hired labor with machinery purchased by the district. The plant used consisted of a ¾-yd. steam shovel, steam drills, dump wagons, scrapers, plows, concrete mixer, etc. The work proved more expensive than had been anticipated and it was suspended in the fall of the year.

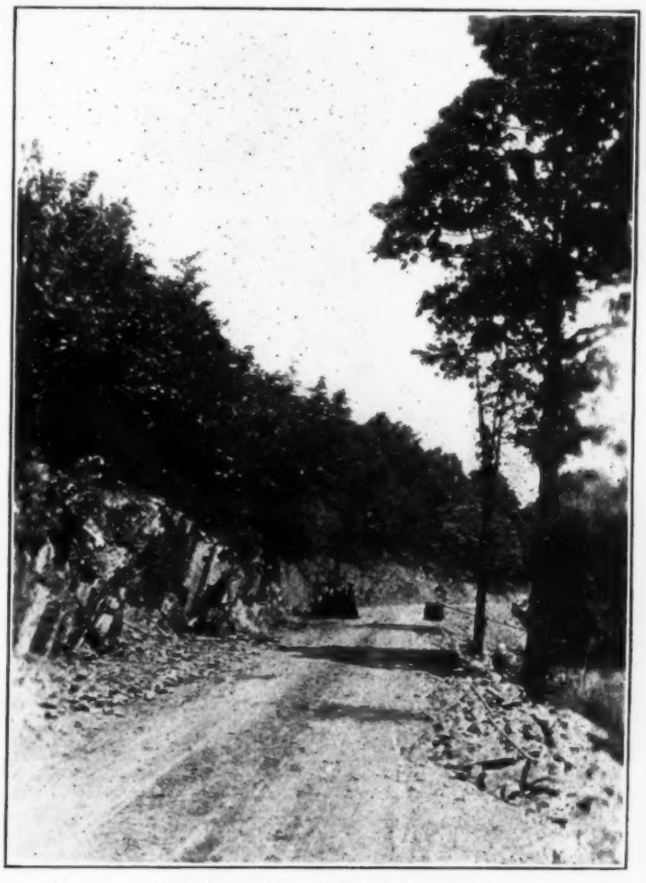
In May, 1922, the writer was called upon to take charge of the work. Plans were prepared for 9½ miles of road, including the 3 miles of hard surfaced road on the Paw Paw section. The contract was awarded on June 12, 1922, to W. J. and J. T. Gephart of Elkins, W. Va., who were required to take over the district machinery at a valuation. The work is now nearing completion.

Because of the scarcity of labor much use is being made of machinery. The excavation is made with the steam shovel and the material is hauled to the fills in dump wagons drawn by teams. Much of the excavation is in shale requiring blasting. Steam drills are used for the harder shale and the rock ledges. Cement for the concrete and coal for the machines are brought to the work in motor trucks. The concrete for the head walls and slab bridges is mixed with a gasoline mixer. The rock for the concrete is obtained locally from selected hard sandstone ledges and crushed by a portable crusher.

The local stone for the base course on the Paw Paw section is obtained from a quarry near the roadside. Some of this rock at first was knapped in place by hand. Later a portable crusher operated by a gasoline tractor was used with good results. The surface course was of standard waterbound macadam construction with tar surface treatment. The finishing and shaping of the roadway and side ditches is done with a road machine operated by a 5-ton gasoline tractor, and excellent results were obtained, as the tractor is powerful enough to pull the grader through the hard "bumps," thus saving plowing or picking by hand.

The design and construction of Class A road work are in accordance with State standards. The roadway is 26 ft. wide, with a maximum grade of 7 per cent. The sharpest curve is 30 deg.

The Class B road improvement includes county roads through rugged territory where existing grades are as steep as 20 per cent in some places. It was decided to concentrate the work on the worst places, using the limited funds to the best advantage.



SIDECUTTING THROUGH ROCK

A MOBILE MIXING PLANT

Three Concreting Units with Chuting Range of 100 Ft. on Job in Cleveland

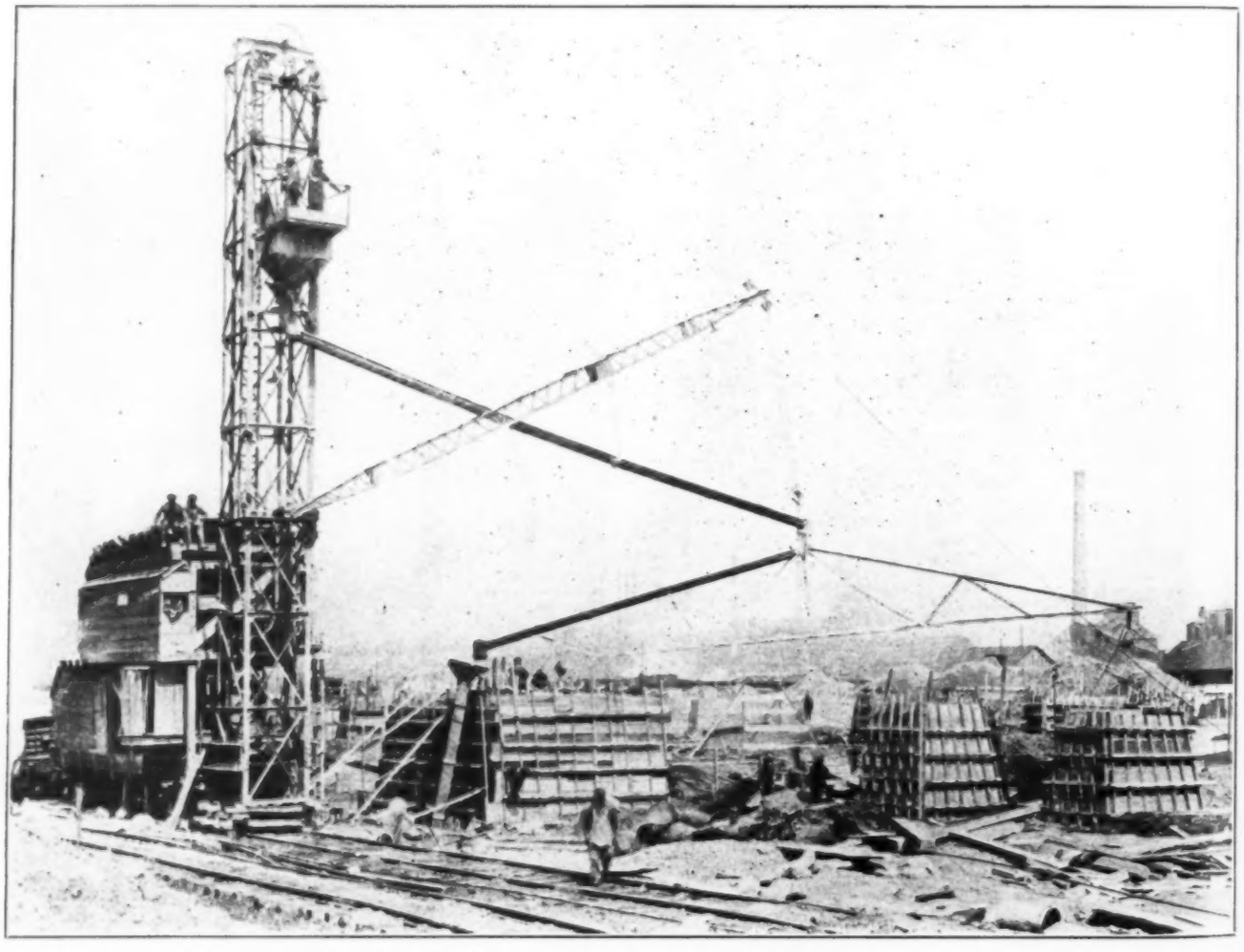
IN connection with the large additions to its plant in Cleveland, Ohio, now under construction, The Otis Steel Company devised a very practical layout for handling the concrete end of the job. As 50,000 cu. yd. of concrete were to be poured over a large area the use of a central mixing plant was impracticable. Conditions demanded a plant which was a self-contained unit and which could be moved from point to pont on the job as required.

To meet this problem, three car plants, similar to the one shown in the photographs were used, each equipped with a 1-yd. electrically driven mixer, electric hoist, 60-ft. steel tower and 100-ft. boom counterweight chuting plant. In rigging up the car plant, a standard gage steel frame car was used and two 24-in. "I" beams were attached to the frame of the car so that they extended out over one end approximately 7½ ft. The steel tower was then fastened to these "I" beams by means of gusset plates.

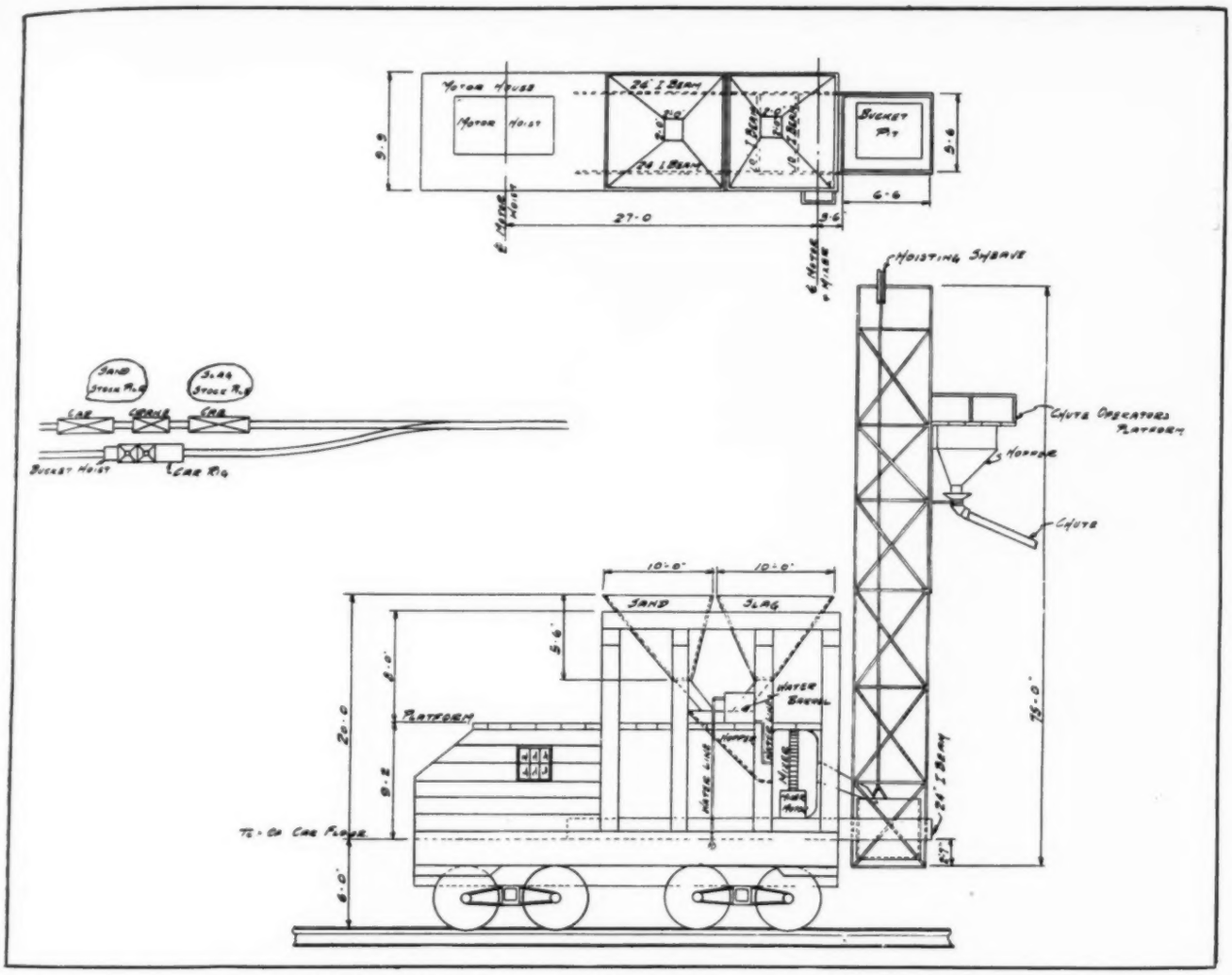
This method of supporting the tower not only gave more room on the car for the hoisting engines, bins and cement shed, but also kept down the over-all height of the car (which is a very important consideration with any type of car plant) because the bucket could be dropped down to practically ground level for loading. As soon as the plant was moved up into position where it was to pour concrete, the tower was immediately blocked up from the rails, as can be clearly seen in the photographs. Only one set of guys was used on the tower and the plant placed concrete over 100 ft. each way from the tower.

The method generally used for the operation of this plant was as follows: Two tracks were laid, one for the car plant and the other for the crane and cars of material. A car of slag was placed ahead of the crane and a car of sand behind it in such a position that the boom could be swung around and a bucket of sand or slag could be handled to the bin with the least amount of time lost. When the cars were emptied, the crane pulled them out and replaced them with loaded cars.

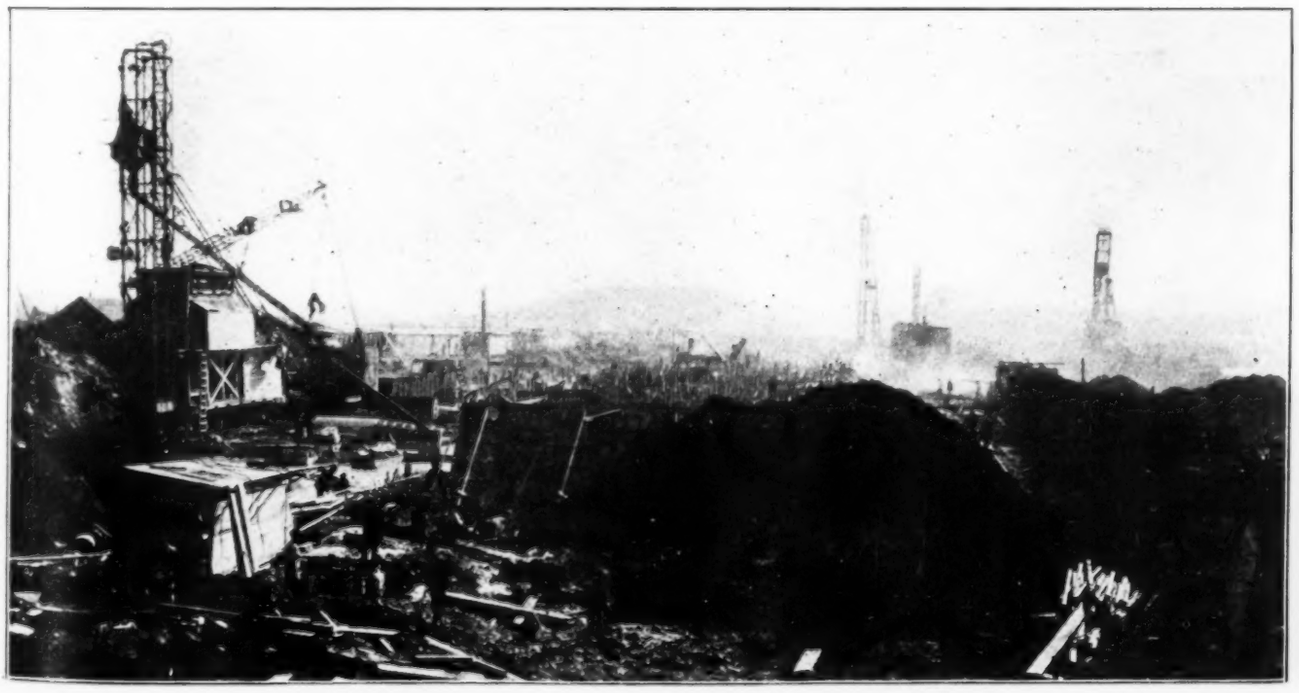
The work has been done by The Otis Steel Company under the supervision of R. E. Brakeman, Chief Engineer, and Roger Culp, Construction Engineer.



THE MIXING PLANT IN OPERATION



THIS DIAGRAM SHOWS THE ARRANGEMENT OF THE MOVABLE PLANT



A GENERAL VIEW OF THE JOB SHOWING MIXERS AT WORK

PLACING CONCRETE REVETMENT ON RIVER BANKS

Simple Tools and Careful Attention to Details Speed Up Progress

By IVAN E. HOUK,
City Engineer, Dayton, Ohio

IN the river channel improvements now being completed in southwestern Ohio as a part of the $30,000,000 Miami Valley flood prevention work, the Miami Conservancy District used concrete slope revetment wherever there was any danger of the river banks being eroded. This revetment, which was used principally at Hamilton and Dayton, where the more important river improvements were made, is in two parts: first, a continuous slope paving made up of reinforced concrete slabs, and second, a flexible mattress made of small concrete blocks.

The flexible mats, which are used on the river bed adjoining the levees, are made of blocks 5 in. thick, 12 in. wide and 24 in. long, tied together by ½-in. galvanized steel cables. Two cables pass through each block and the blocks are staggered like brick in a wall, so that the result is a flexible yet continuous mat held together in both directions. The slab revetment, which is used on the levee slopes immediately above the flexible mats, is made of slabs 6 in. thick, 8 ft. wide, and of variable length, depending on the height to which the flood waters will rise. The element of flexibility was introduced into the paving at the foot of the levees in order to take care of settlement at the river edges of the revetment, caused by undercutting during flood periods, and, as shown in one of the photographs, is making good.

Footings 24 in. wide and 18 in. deep are constructed at the lower ends of the slabs, and larger block, 18 in. wide and 12 in. deep, are placed along the river edges of the mats. Rows of timber piles, driven into the river bed along the toes of the levees before the revetment was placed, furnish anchorages for both sections, the cables from the flexible mats being tied to the piles and the footings at the lower ends of the slabs being cast around the heads of the piles. Additional protective factors were secured by driving rows of interlocked steel sheet piling at right angles to the stream and about 300 ft. apart, extending from the timber piles about half way to the river edge of the mattress, the tops of the piles being covered with concrete, thus anchoring the cross walls to the mattress as well as to the timber piles.

The general order of placing the revetment was first to drive the piles, both timber and steel, then lay the flexible mattress, then cast the slabs on the levee slopes, and then cast the larger blocks along the river edge of the mattress and the cross walls along the tops of the steel piling. Of course, the levee slopes, as well as the river bed adjoining the levees, had been brought to the proper grade when the work was started.

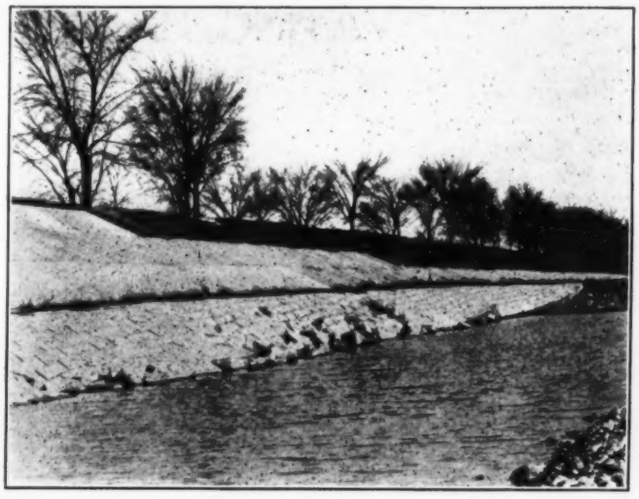
Laying the small blocks was the most interesting as well as the most unusual part of the work. It was

POURING THE CONCRETE SLABS IN ALTERNATE SECTIONS USING STEEL FORMS

first necessary to take the kinks and curvature out of the cables. This was done by pulling the cable through a set of three grooved wheels, staggered in such a way as to counteract the curving effect of the reels on which the cables were shipped. The cables were then cut into the proper lengths, using shears with circular arc jaws, so as to keep the individual strands together instead of spreading them apart, thus giving the ends a blunt rounded shape which was easily threaded through the holes in the blocks. The

TWO MEN CARRY BLOCK TO PLACE

blocks were then laid, a row at a time, beginning at the levee edge of the mattress. Two men, using a specially made pair of tongs, brought each block to its proper position, where a third man threaded the cables through the holes. A fourth man then pulled the cables through far enough to take another block,



ONE OF THE COMPLETED SECTIONS SHOWING THE ADVANTAGE OF FLEXIBILITY

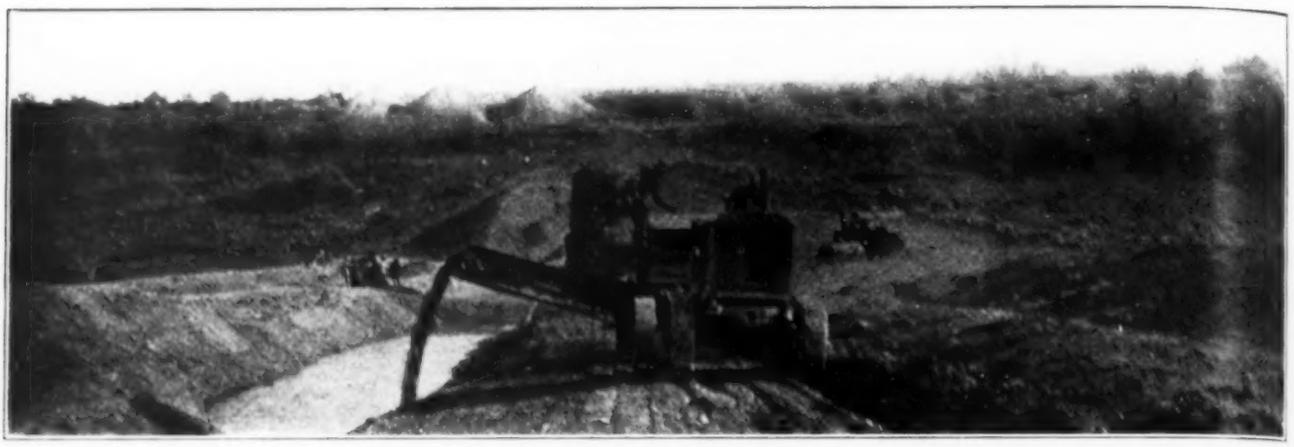
using a simple lever, as shown in one of the accompanying views.

The slabs on the levee slopes were cast in alternate sections, placing the movable mixer either on the flexible mattress or on the levee top, and chuting the concrete directly into place. Six-inch steel channels were used as forms for the sides, a 6-in. plate for the top, and an angle iron, resting on the concrete blocks, for the bottom. Of course, when slabs were being poured between slabs the channels at the sides were not needed.

The work was done by Price Brothers, contractors, under a special arrangement with the district.

THIS SIMPLE LEVER OPERATED BY ONE MAN PULLED CABLES THROUGH BLOCKS

ELEVATING GRADER FILLS CORE OF DAM

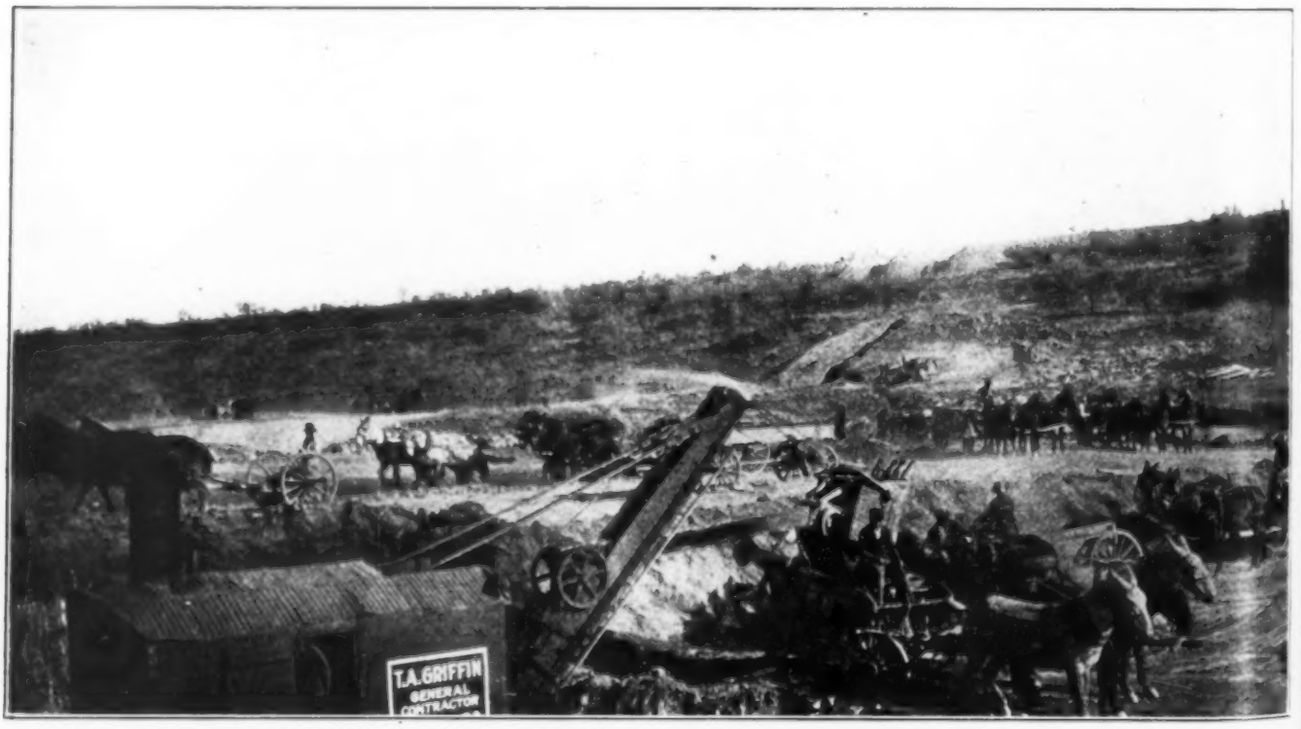


AN interesting use is being made of an elevating grader near Coleman, Texas, where a dam is being built 4½ miles from the city for the purpose of storing an adequate water supply. This is in Texas, where they know how to make an elevating grader do nearly everything but talk, and perhaps a statement of methods may help solve some similar problems in some other States where this machine is not so well known.

The dam in question, for which the Tibbett Construction Company of Fort Worth has the contract, is an earth dam 1100 ft. long and 55 ft. high, with a core wall of puddled clay. The embankment is being placed in 12-in. layers thoroughly rolled and wet, the material being handled in 1½-yd. dump wagons. How to fill the core trench with selected clay from a nearby pit most economically was the problem.

The contractors decided to use an elevating grader for this work. The clay is dug with a steam shovel and loaded into 1½-yd. dump wagons which deposit the material parallel to the trench throughout its entire length. Then instead of pushing the clay into the trench by means of a tool known as a bulldozer, they plow through the stuff with a tractor-drawn elevating grader. The furrow is turned upon a belt conveyor which carries it across and upward, until it is cast from the opposite side of the machine directly into the trench as fast as the tractor can pull the machine. This method is about the cheapest known.

The dam will have been completed before the end of September and the lake which will form back of it will store 631,000,000 gal. of water. By carrying the height of the dam 25 ft. further, a storage capacity of about 4,000,000,000 gal. can be obtained.



LOADING WAGONS WHICH TRANSPORT CLAY TO EDGE OF TRENCH. THE UPPER PHOTOGRAPH SHOWS THE GRADER PICKING UP THE CLAY AND FILLING THE CORE OF THE DAM

STEEL TANKS PROTECT QUARRYMEN

MEN engaged in blasting at quarries need some safety refuge that can be readily moved from place to place as the work progresses. Without such a protection the men spend too much time in getting off to a safe distance and then coming back to work. The Louisville Cement Co. of Louisville, Ky., has happily solved the problem, and is speeding up production, by the simple expedient of providing cylindrical steel tanks. These tanks were formerly coolers in the cement mill proper. They were converted into places of safety by merely closing up one end with heavy timbers and bolting 2 x 4-in. timbers extending a full length on either side for the men to brace themselves against. These tanks can easily be rolled from place to place and can be stationed fairly close to the blast.

OILCLOTH SACKS USED FOR BLASTING UNDER WATER

A DYNAMITE blasting job which attracted great interest took place recently at Rockford, Ill., where 200 piers of the old military bridge, which crossed Rock River at the south entrance to Camp Grant, were demolished. The work was in charge of Jay G. Jackson. One interesting phase of the operation was that he used oilcloth casing, wrapping charges of sticks of dynamite in the sacks and tying them to the piers under water. Mr. Jackson stated that cheap table oilcloth was used to make the sacks, which were sewed with the oil side in.

The blasting down of the piers was determined on because boaters frequenting the lower river had been imperiled by jagged stumps protruding from the water. There had been frequent complaints as a result of narrow escapes from accidents.

GOOD FOOD WILL SPEED WORK

GOOD food is an important factor in keeping up the morale of the workers on any construction job. This was never better illustrated than by an incident which occurred recently on one of the biggest construction jobs of its kind in the East. The contractor on this job is already behind his schedule, and one reason for this is his failure to keep his gangs of men at full strength.

He recently recruited a gang of 35 men from one of the big cities 100 miles distant and paid their fare to camp. On the first day 25 of them left without even working out their fares. They based their complaint on the poor quality of the food which they were getting. On any job where the contractor establishes his own commissary he will save money in the long run by seeing to it that the men are satisfied with their food.

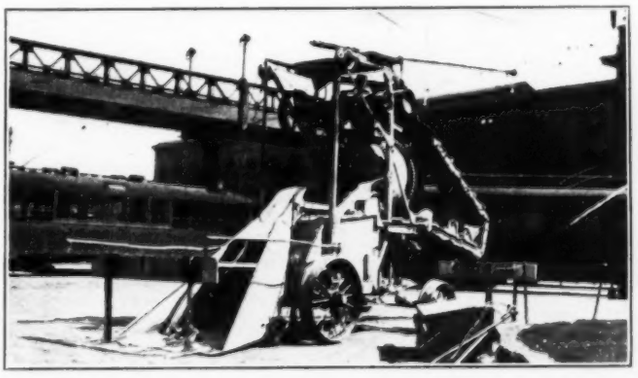
CONSIDER THE PUBLIC

THE importance of keeping on the right side of the public is being brought home to the contractors of Chicago at the present time, who are busy fighting a proposed ordinance which, if passed, will compel them to bring all building materials into the congested Loop district at night. Complaints have been made that the streets are blocked while materials are being brought in and hoisted during the busy hours of the day, and these complaints have been sufficient to cause the proposal of the ordinance just described.

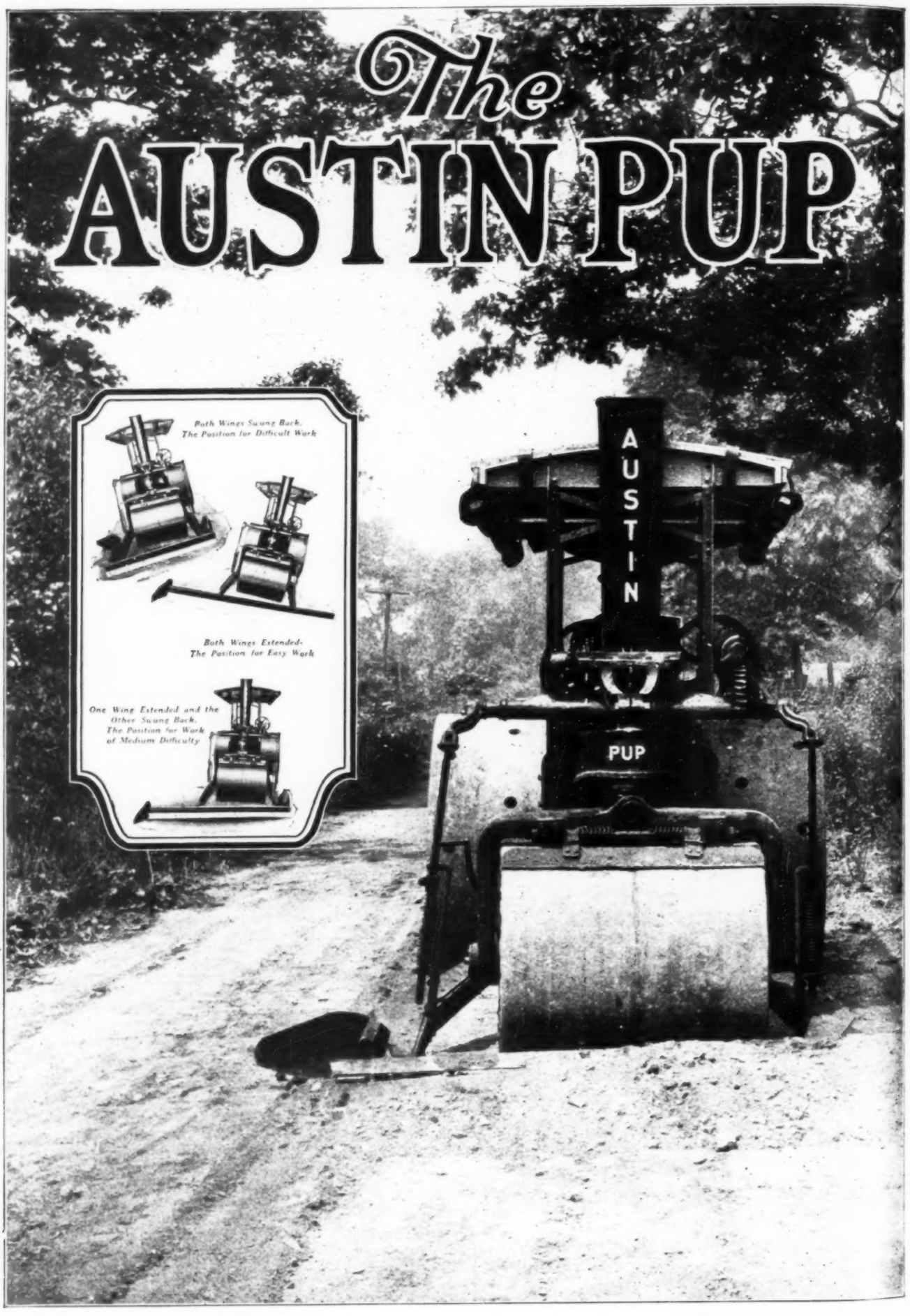
Luckily the contractors are able to prove that the delays caused by them are greatly exaggerated and may succeed in blocking the ordinance. But the fact that such a situation has arisen shows that it is always wise for a contractor to inconvenience the public just as little as he possibly can.

A TROLLEY MIXER

AN unusual concrete mixer is being used by the Market Street Railways in paving the street car tracks on Market Street in San Francisco, where the tracks are being raised about 24 in. in some places. The concrete mixer has been equipped with flanged wheels and a trolley pole, so that it can travel along the track by its own power. It operates on one of the two tracks while pouring the pavement base for the other track.



Current for the electric motor on the mixer is obtained from the trolley wire just as on a street car. The same electric motor that drives the mixer along the tracks also operates the mixing drum. As work is being carried on only at night, the concrete mixer each morning is run to a point in front of the Ferry building, where it is run from the street car tracks and parked for the day as shown in the photograph.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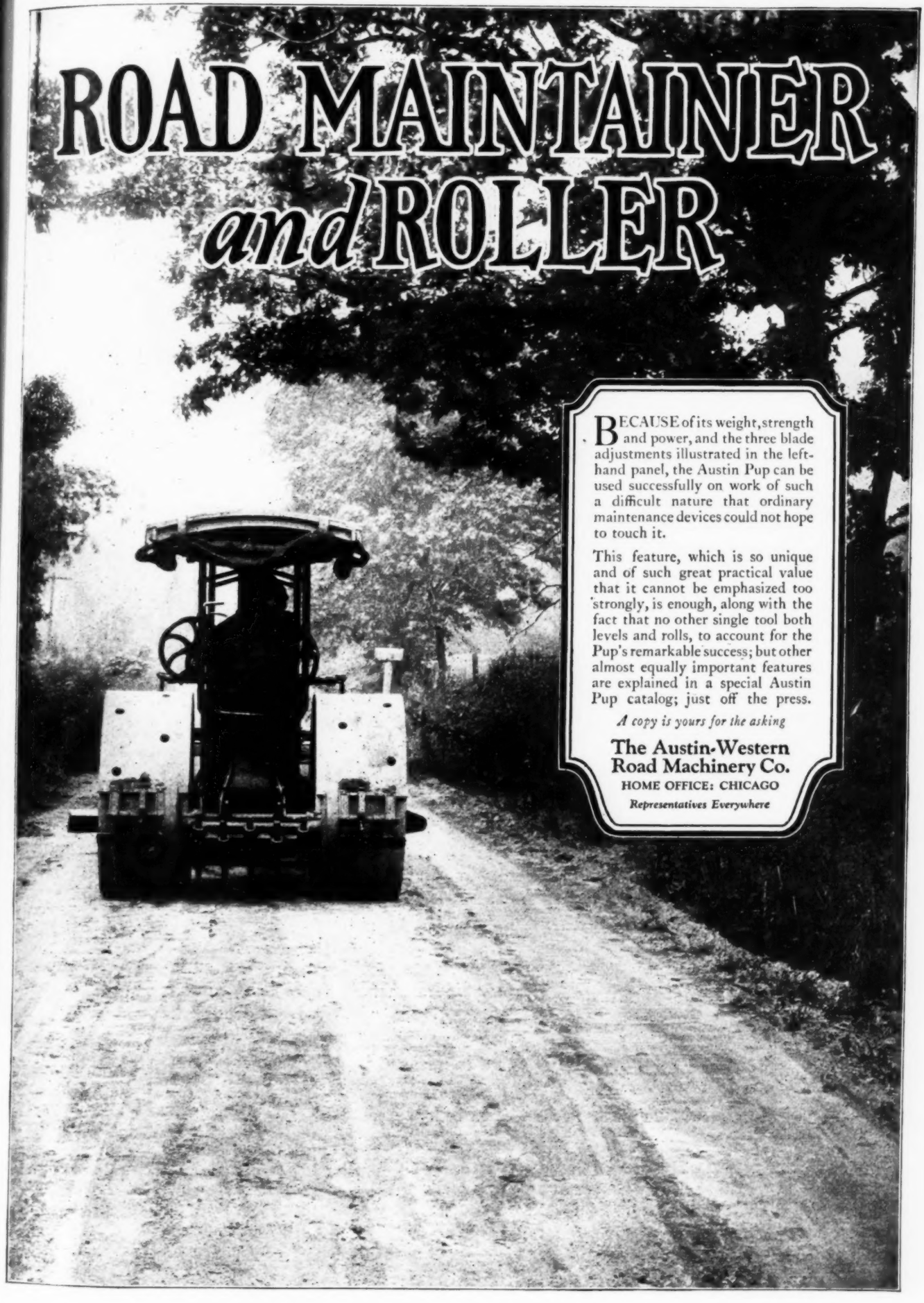

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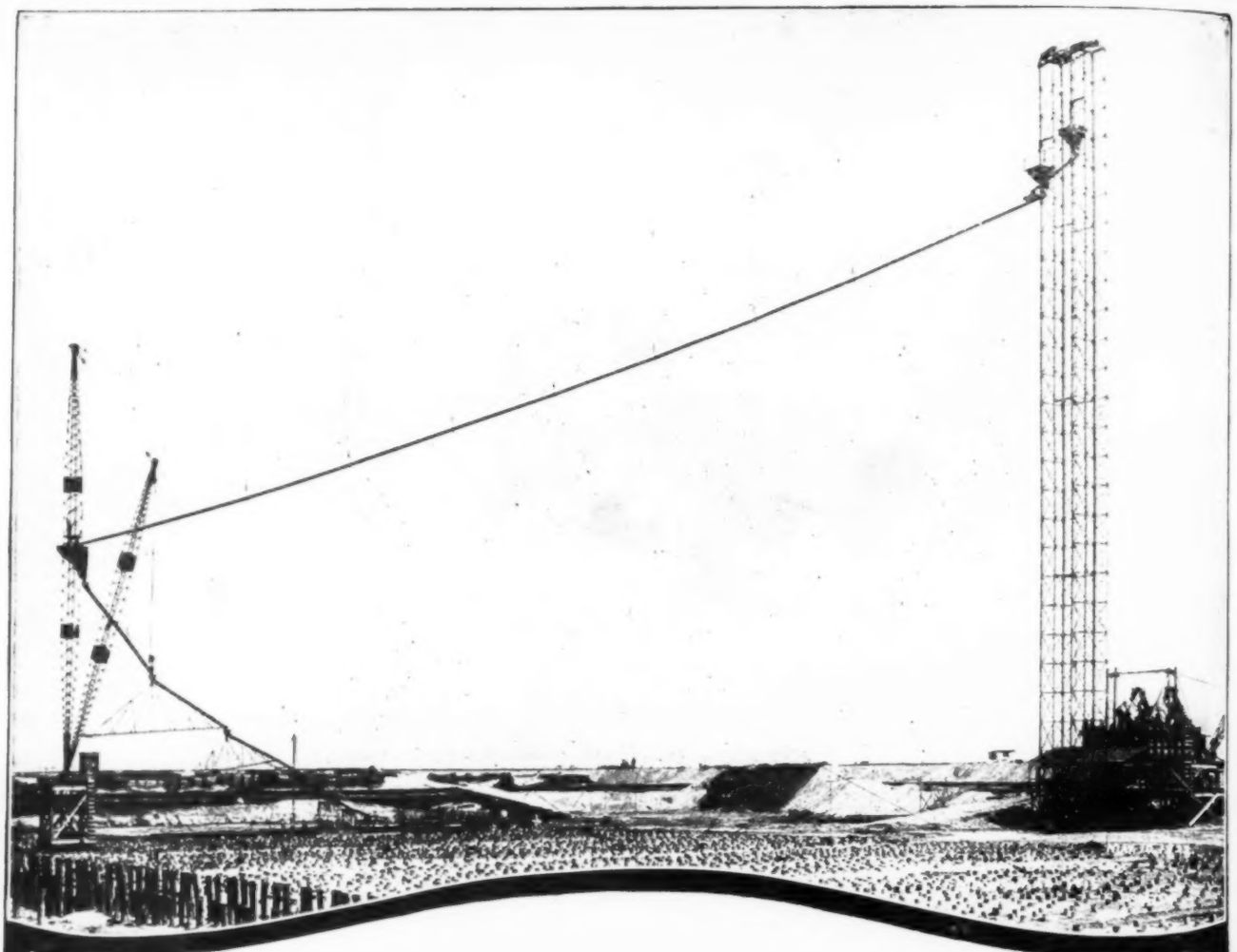

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